

The Safety and Clinical Outcome in Unprotected Intervention of Left Main Coronary Artery Stenosis in Maharat Nakhon Ratchasima Hospital

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Background: Instead of coronary artery bypass graft (CABG) for critical or severe left main artery (LMCA) disease patients, up to now percutaneous coronary intervention (PCI) with drug-eluting stent (DES) is more frequently considered in unprotected LMCA stenosis. It might be due to co-morbidities, high surgical risk, and /or patient's preference. **Objective:** To evaluate the safety and clinical outcome of PCI with DES (and BMS implantation) in unprotected LMCA in Maharat Nakhon Ratchasima Hospital. **Patients & Methods:** Retrospective review of the patients with LMCA who were treated with PCI with DES inspite of unprotected LMCA. The outcome and the immediate and late complications were i.e. major adverse cardiovascular and cerebral events (MACCE) and target vessel revascularization. The recruitment period was between October 2005 to October 2009. **Results:** Twenty-seven patients were enrolled, 20 of them (64%) were implanted with DES. The procedure was successful in all, but one was dead in hospital (3.7%) and two had MACCE (7.9%) in the hospital. The rest of them were followed within 6 to 48 months with repeated catheterization or 64-slides computerized tomography angiogram 19/27 (70.3%), 2 were additionally dead (7.4%), 7 developed MACCE within 6 months (25.9%) while 6 needed repeated target vessel revascularization (TVR) (22.2%). **Conclusion:** PCI with DES in cases of LMCA stenosis could be performed with high successful rate in spite of unprotected left main. Death rates were 3.7% and 7.4% as immediate and late complication respectively, 22.7% needed repeated TVR.

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บทคัดย่อ: ความปลอดภัยและผลทางคลินิกในการขยายหลอดเลือดหัวใจ Left Main แบบ Unprotected ในโรงพยาบาลมหาราชนครราชสีมา

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ภูมิหลัง: ผู้ป่วยที่มีการตีบตันของ left main coronary artery (LMCA) ในระดับที่มีนัยสำคัญ มักจะได้รับการรักษาด้วยการผ่าตัดเส้นเลือดหัวใจซึ่งเป็มาตรฐานในการรักษาแต่ปัจจุบันมีความก้าวหน้ามากขึ้นในการรักษาโดยใส่ขดลวดค้ำยันผ่านสายสวนหัวใจในผู้ป่วยส่วนหนึ่งที่ไม่สามารถผ่าตัดได้ด้วยข้อจำกัดต่อการผ่าตัด, โรคร่วมของผู้ป่วย หรือผู้ป่วยปฏิเสธการผ่าตัด **วัตถุประสงค์** เพื่อศึกษาความปลอดภัยและผลทางคลินิกในการขยาย LMCA แบบ unprotected ในโรงพยาบาลมหาราชนครราชสีมา **ผู้ป่วยและวิธีการ:** เป็นการศึกษาในกลุ่มผู้ป่วยหลอดเลือดหัวใจตีบที่ LMCA ที่ได้รับการรักษาด้วยการใส่ขดลวดค้ำยันผ่านสายสวนหัวใจในโรงพยาบาลมหาราชนครราชสีมา ตั้งแต่เดือนตุลาคม 2548 ถึงเดือนตุลาคม 2552 เพื่อดูผลการรักษาและภาวะแทรกซ้อน ได้แก่ อัตราการเสียชีวิต อัตราการเกิดกล้ามเนื้อหัวใจตายซ้ำ, อัตราการเกิดอัมพาตและอัตราการกลับตีบซ้ำในขณะที่อยู่ในโรงพยาบาลและขณะติดตามการรักษาที่ 6-48 เดือน **ผลการศึกษา:** พบผู้ป่วยหลอดเลือดหัวใจตีบที่ LMCA ที่ได้รับการรักษาโดยใส่ขดลวดค้ำยันผ่านสายสวนหัวใจในโรงพยาบาลมหาราชนครราชสีมา 27 ราย ซึ่งใส่ขดลวดเคลือบยา 20 ใน 27 ราย (ร้อยละ 64.0) ประสบความสำเร็จโดยไม่มีภาวะแทรกซ้อนถึง 24 ราย (ร้อยละ 88.9), อัตราการเสียชีวิตในโรงพยาบาล 1 ใน 27 ราย (ร้อยละ 3.7), อัตราการเกิดภาวะแทรกซ้อนทางหลอดเลือดหัวใจและหลอดเลือดสมองในโรงพยาบาล 2 ใน 27 ราย (ร้อยละ 7.9) มีผู้ป่วยมาตรวจติดตามที่ 6 เดือนถึง 48 เดือนครบร้อยละ 100 และมีผู้ป่วยได้รับการติดตามด้วยการสวนหัวใจซ้ำหรือเอกซเรย์คอมพิวเตอร์หลอดเลือดหัวใจชนิด 64 ภาพต่อวินาที 19 ใน 27 ราย (ร้อยละ 70.3) พบการเสียชีวิตเพิ่มอีก 2 ราย (ร้อยละ 7.5) และเกิดภาวะแทรกซ้อนทางหลอดเลือดหัวใจและหลอดเลือดสมองที่ 6 เดือนอีก 7 ราย (ร้อยละ 25.9) และจำเป็นต้องขยายเส้นเลือดหัวใจซ้ำ 6 ใน 27 ราย (ร้อยละ 22.2) **สรุป:** การสวนหัวใจขยายเส้นเลือดหัวใจในตำแหน่ง left main coronary artery แบบ unprotected ในโรงพยาบาลมหาราชนครราชสีมาสามารถทำได้สำเร็จทุกราย โดยมีอัตราตายร้อยละ 3.7 ในโรงพยาบาล, อัตราตายร้อยละ 7.4 ในระยะติดตามและมีอัตราการตีบซ้ำซึ่งต้องขยายและใส่ขดลวดซ้ำร้อยละ 22.7

Introduction

Lesions in the unprotected left main coronary artery (LMCA) disease are one of the most challenging lesion subset in percutaneous coronary intervention

(PCI). The surgical revascularization is considered the standard for them⁽¹⁻⁴⁾. Some studies have demonstrated that stenting of the unprotected LMCA is feasible and appears to be a promising strategy in selected patients

especially in case of the patients' preference and refusal of coronary artery bypass graft (CABG), or co-morbid conditions resulting in high risk and the inappropriateness for emergency CABG⁽⁵⁻¹¹⁾. Recently, use of a drug-eluting stent (DES) has been associated with a low restenosis rate⁽¹²⁻¹⁷⁾.

Patients & Methods

The patients' clinical presentation of acute coronary syndrome as stable angina, non ST elevation myocardial infarction (NSTEMI) and ST elevation myocardial infarction (STEMI) in Maharat Nakhon Ratchasima Hospital were retrospectively collected from October 2005 to October 2009, who were diagnosed significantly as LMCA disease by angiographic evidence of greater than 50% diameter stenosis. PCI was done in case of the patients' preference and refusal of CABG or high risk co-morbid conditions. Data collection was checked to confirm decrease in case of loss to follow-up. Major adverse cardiovascular and cerebral events (MACCE) were followed up within 6-48 months.

Definitions

Unprotected LMCA was defined as no any previous CABG. Angiographic success was defined as a residual lesion less than 20% after angioplasty. Procedural success was defined as less than 30% residual stenosis by quantitative coronary angiogram, with no major procedure or in-hospital complications, such as death, Q-wave myocardial infarction and emergency CABG. Mid-term outcome was defined as the outcome of at least 6-month follow-up. Target vessel revascularization (TVR) was defined as repeated PCI performed within 6 to 48 months. MACCE were defined

as the outcomes of all causes of death, nonfatal myocardial infarction or target lesion revascularization during follow-up and stroke. Deaths were classified as either cardiac or noncardiac. Deaths that could not be classified, were considered as cardiac-related.

Results

Twenty-seven patients were included in this study, age range 24-91 years (mean 64.0±11.2 years). The majority were male 15/27 (55.6%). The underlying diseases comprised hypertension 14/27 (51.8%), smoking 9/27 (33.3%) and diabetes 7/27 (26.0%). We found 8/27 (29.6%) STEMI, 9/27 (33.3%) impaired left ventricular function (ejection fraction less than 40%) and 5/27 (18.5%) cardiogenic shock. (Table 1)

Table 1 Baseline clinical characteristics of studied patients

	Cases (%) N=27
Male	15 (55.6)
Age-yr (range)	64.0±11.2 (24-91)
Cardiovascular risk factor	
- Hypertension	14 (51.8)
- Diabetes mellitus	7 (26.0)
- Hyperlipidemia	9 (33.3)
- Smoking	9 (33.3)
- Family history of CAD	-
- Obesity	-
- Previous MI	-
- Previous CABG	-
- STEMI	8 (29.6)
- UA/NSTEMI	19 (70.3)
- LVEF <40%	9 (33.3)
- Congestive heart failure	10 (37.0)
- Cardiogenic shock	5 (18.5)

Abbreviated: CAD: coronary artery disease, MI: myocardial infarction, CABG: coronary artery bypass graft, STEMI: ST elevation myocardial infarction, UA: unstable angina, NSTEMI: non- ST elevation myocardial infarction, LVEF: left ventricular ejection fraction

Angiographically finding were 10/27 (37.0%) isolated LMCA stenosis, 5/27 (18.5%) 3-vessel disease with LMCA stenosis. Two-thirds of the patients, 20/27 (74.0%) were successfully performed PCI with DES and only 1 patient was dead on day 3 after PCI (Table 2).

Table 2 Angiographic and procedural characteristics of lesion in this study

	Cases (%) N=27
Lt main lesion location (%)	
- Ostial	11 (40.7)
- Mid	1 (3.7)
- Distal	13 (48.1)
- All part	2 (7.4)
Number of vessel disease (%)	
- Lt main disease	10 (37.0)
- 1 vessel disease	6 (22.2)
- 2 vessel disease	6 (22.2)
- 3 vessel disease	5 (18.5)
Mean diameter stenosis-mm (range)	3.6±0.28 (2.5-4.5)
Stent diameter <3mm	1 (3.7)
Mean stent length-mm (range)	18.0±5.24 (8-33)
High pressure inflation>16 ATM	7 (26.0)
Bifurcation technique	
- Single stent (%)	23 (85.2)
- Two stent (%)	4 (14.8)
Find kissing (%)	13 (48.1)
Type of stent	
- Bare metal stent	7 (26.0)
- Drug eluting stent	20 (64.0)
Procedural success	27 (100.0)

Table 3 In hospital outcomes and Mid-term follow up

	Cases (%)
In hospital outcomes	
- All cause death	1 (3.7)
- MACCE	3 (11.1)
- Cardiac death	1 (3.7)
- Myocardial infarction	2 (7.4)
- Target vessel revascularization	0
Mid-term follow up 6-48 months	
- All cause death	2 (7.5)
- MACCE	7 (25.9)
- Cardiac death	0
- Target vessel revascularization	6 (23.0)

Two patients were dead, one died of refractory congestive heart failure from STEMI with cardiogenic shock and the other one died of liver cancer at 6-month follow-up. MACCE were found in 7/27 (25.9%). TVR was detected 6/27(23.0%) and 5/6 were found at Ostial left circumflex artery and 1/6 at LAD angiographically at 6-month follow-up and re-intervention with plain old fashion balloon was performed for target lesion revascularization (TLR) (Table 3). Angiography and 64-slice computer tomography follow-up schedules were

Table 4 Comparison of this study and others

	Maharat	Syntax ⁽¹⁸⁾	J-cypher registry ⁽¹⁹⁾
Overall mortality	7.5%	4.4%	14.4%
Overall MACCE	25.9%	17.6%	ND
Overall TLR	22.7%	13.5%	Ostial- body 3.6%
			Distal Lt main 17.1%

Abbreviated: MACCE: major adverse cardiovascular and cerebral events, ND: no data, TLR: target lesion revascularization

arranged between 6-48 months in 20/25 (80.0%) and exercise stress test was performed in 5/25 (20.0%).

Discussion

Standard management of unprotected LMCA stenosis as a guideline is CABG. Bare metal stent (BMS) implantation was reported formerly about its long-term outcome on unprotected LMCA stenosis intervention. Recently PCI with DES showed data of reduced restenosis risk by Syntax trial and J-Cypher registry (Japanese study).

This four-year study collected data between October 2005 to October 2009 of Maharat Nakhon Ratchasima Hospital (MHR), there were 9/27 (33.0%) emergently transferred with STEMI with cardiogenic shock. They had co-morbidities and high risk for emergency CABG, or they preferred PCI. None of them had stable angina.

TLR in MHR was quite high because of high risk patients for emergency PCI. However, ostium and mid-shaft of LMCA PCI revealed satisfactory results without TLR.

After our retrospective analysis with good clinical outcomes, we presume that PCI of LMCA disease recommended by the American College of Cardiology / American Heart Association (ACC/AHA) guidelines should be considered revised from Class III to be Class II a. The revolution of PCI by DES and intravascular ultrasound have been more recognized to improve on positive procedure outcomes.

Study Limitations

We had very small amount of patients to determine the efficient results because most of significant

LMCA disease were performed CABG.

Conclusions

The main findings of this study are: 1) use of DES to treat unprotected LMCA lesions appears feasible with a very high procedural success rate (100.0%), 2) a significant reduction of the occurrence of MACCE at 6-48 months is observed with acceptable results, 3) the incidence of death and cardiac death are lower despite the lack of elimination of re-stenosis and TLR, 4) all re-stenosis lesions in these patients are focal. Emergency percutaneous intervention of unprotected LMCA disease is feasible with fair mid-term clinical outcomes.

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